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Justin Remhof

Old Dominion University, jremhof@odu.edu

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Naturalism, Causality, and Nietzsche's Conception of Science

JUSTIN REMHOF

ABSTRACT: There is a disagreement over how to understand Nietzsche's view of science. According to what I call the Negative View, Nietzsche thinks science should be reconceived or superseded by another discourse, such as art, because it is nihilistic. By contrast, what I call the Positive View holds that Nietzsche does not think science is nihilistic, so he denies that it should be reinterpreted or overcome. Interestingly, defenders of each position can appeal to Nietzsche's understanding of naturalism to support their interpretation. I argue that Nietzsche embraces a social constructivist conception of causality that renders his naturalism incompatible with the views of naturalism attributed to him by the two dominant readings.

KEYWORDS: Nietzsche, science, causality, naturalism, ontology, constructivism

There is a genuine disagreement over how to understand Nietzsche's view of science. Dominant interpretations inform two contrary approaches. According to what I call the Negative View, Nietzsche thinks science should be reconceived or superseded by another discourse, such as art, because it is nihilistic.¹ Reconceiving science involves reinterpreting the typical aim or nature of scientific work, and superseding science involves subordinating a cognitive, rational perspective on the world to a different perspective, usually an aesthetic one. An opposing interpretation, which I call the Positive View, argues that Nietzsche does not think science is nihilistic, and thus that science should not be reconceived or superseded.²

Interestingly, each position can appeal to Nietzsche's understanding of naturalism to defend its approach. Those who support the Negative View might claim that naturalism gives Nietzsche a strong reason to be skeptical of science because science requires achieving a wholly nonpersonal perspective on the world that undermines a healthy understanding of human reality.³ A wholly nonpersonal perspective is one that fully removes the first-person perspective in inquiry. Advocates of the Positive View could maintain that Nietzsche's own work is committed to the naturalist position that philosophy should emulate the sciences by preferring empirical explanations, specifically *causal* explanations,

to other kinds of explanation.⁴ This assumes Nietzsche must not think science is nihilistic. An obvious way to reconcile these different approaches is to say that Nietzsche is sympathetic to both and they are not in conflict. Perhaps his positive regard for the sciences tracks the Positive View's conception of his naturalism, while his skepticism is limited to the conception emphasized by the Negative View. My own view is that the resolution is not so easy. This essay argues that Nietzsche embraces a view of causality that renders his naturalism incompatible with the views attributed to him by the two dominant readings. I suggest that Nietzsche holds a *constructivist* view of causality, according to which the identity conditions of causal events are constitutively dependent on our judgments about the world. It will emerge that constructivism provides a middle way between the two leading views and prompts a new understanding of Nietzsche's naturalism.

Naturalism and the Negative View

Consider first how the dominant interpretations of Nietzsche's view of science represent Nietzsche's position on naturalism. Deleuze can be read as a supporter of the Negative View. He writes that for Nietzsche "science is part of the *nihilism* of modern thought" because its ultimate goal is to deny differences by seeking the "*undifferentiated*."⁵ This is motivated by a passage from the third essay of *GM*: "Since Copernicus, man seems to have got himself on an inclined plane—now he is slipping faster and faster away from the center into—what? into nothingness? into a 'penetrating sense of his nothingness'? Very well! hasn't this been the straightest route to—the *old* ideal? [. . .] All science [. . .] has at present the object of dissuading man from his former respect for himself" (*GM* III:25).⁶ Copernicus replaced the Ptolemaic geocentric or Earth-centered system with the heliocentric or sun-centered system. This change in scientific understanding removes human beings from a position of centrality in the cosmos. Nietzsche associates science "since Copernicus" with a dangerous "*old* ideal," the *ascetic* ideal. The ascetic ideal is nihilistic because it leads people to posit values that cannot be realized in the conditions of this world.⁷ The issue to examine is why Nietzsche thinks science since Copernicus is nihilistic.

For Nietzsche there is something crucial about our view of what it is to be human that is being increasingly lost in the transformation to the new scientific perspective. Science is attempting to provide an understanding of ourselves in a way that results in our "slipping [. . .] into nothingness." Explaining "the nihilistic consequence of contemporary natural science" in his notebooks, Nietzsche remarks, "since Copernicus man has been rolling from the center toward 'X'" (*KSA* 12:2[127]).⁸ The "X" appears to signal the advance of a naturalist perspective that endeavors to explain human reality as nothing more than the goings-on

of complex physiological systems in a physical universe. Deleuze seems to have this conception of naturalism in mind when he writes that Nietzsche is worried about science seeking the “*undifferentiated*.”⁹ The ultimate goal of this naturalistic project is to achieve a nonpersonal perspective on the world, which, if attained, would effectively eradicate any robust notion of the first-person standpoint in inquiry.¹⁰ Nietzsche indicates that retaining the first-person perspective is required for maintaining a dignified understanding of human reality. The “nothingness,” he proclaims, is “dissuading man from his former respect for himself” (*GM* III:25). Nietzsche of course wants us to accept that human reality is “nothing” in the sense that it is not ultimately unique in relation to other phenomena in the “great chain of being,” such as other animals (*GM* III:25). The naturalistic perspective after Copernicus, though, increasingly eliminates the chance to develop a healthy relationship to our lives in the future.

According to Deleuze the advance of this sort of naturalism gives Nietzsche a strong reason to be skeptical of the scientific discipline. Deleuze’s considered view is that Nietzsche should have attempted to reconceive science in order to meet growing concerns about nihilism.¹¹ Whether or not this prescription is warranted, I take Deleuze to be correct that Nietzsche believes eradicating the first-person perspective is nihilistic. It will emerge below that sensitivity to the weight of this issue is absent from the Positive View.

Naturalism and the Positive View

Many commentators are attracted to the Positive View because they believe Nietzsche embraces the naturalist position that philosophy should favor empirical explanations over other sorts of explanation. It is often argued that Nietzsche’s naturalism requires providing causal accounts of natural phenomena. For Leiter, Nietzsche believes naturalistic explanations take over from science the view that phenomena have “deterministic causes.”¹² Green asserts that for Nietzsche naturalism is the demand that “explanations of what human beings do be causal.”¹³ And Clark and Dudrick contend that on Nietzsche’s view an utterance from a “naturalistic perspective” is one “in terms of causes and effects.”¹⁴ In what follows, I am primarily concerned with Clark and Dudrick’s reading, though my remarks will apply to any interpretation of Nietzsche’s naturalism that depends on a notion of causality.

Clark and Dudrick argue that Nietzsche’s reading of Afrikan Spir led him to a conception of naturalism that responds to a tension between naturalism and normativity. Spir holds that causes and reasons are ontologically distinct. Causes are physical, whereas reasons are normative. Accordingly, Clark and Dudrick argue that Nietzsche embraces the naturalist thesis that “[i]f an empirical explanation of a phenomenon is possible, that explanation is to be preferred to an explanation of another kind,” and “empirical explanation” means “causal

scientific explanation.”¹⁵ This formulation allows Nietzsche to claim that some phenomena, specifically human activities, should not be understood causally. Clark and Dudrick hold that for Nietzsche our behavior can properly be understood only within the context of a space of reasons. Hence, a correct understanding of Nietzsche's naturalism requires separating the causal from the normative.

Clark and Dudrick do not attempt to understand Nietzsche's own conception of causality. Clark famously argues that the mature Nietzsche is a “common sense realist.”¹⁶ A common sense realist thinks science provides knowledge of a world that exists ontologically independent of our representations of it.¹⁷ On this view, ontological independence implies constitutive independence. Embracing common sense realism, then, entails commitment to the view that causal events exist as they do constitutively independent of our interpretations. Clark and Dudrick appear to believe this conception of causality informs Nietzsche's naturalism.¹⁸ Indeed, the position according to which Nietzsche thinks the nature of empirical phenomena exists constitutively independent of us is common among those who support the Positive View.¹⁹

On my reading Nietzsche has a positive view of science, but not one that supports the naturalism embraced by the Positive View under consideration. I also believe Nietzsche's positive conception of science is responsive to worries about eradicating the first-person standpoint in inquiry. Clark and Dudrick appear to take into account the importance of such a perspective by isolating the normative domain of judgment from the empirical domain of causes. I argue below, however, that on Nietzsche's view a proper understanding of causality requires having a proper understanding of our judgments about the empirical world. My own position is that for Nietzsche an adequate understanding of causality will regard causal events as constitutively dependent on human interpretation and that a proper consideration of his naturalism must take this into account. I take this conception of causality to be motivated by Nietzsche's commitment to a constructivist conception of science, though of course I cannot argue for that claim here. Scientific constructivism holds that all facts that can be encountered in experience are constitutively dependent on scientific representations. It is important to notice that on a constructivist conception of science causal phenomena must be understood through the space of reasons in which agents make judgments about such phenomena.

Causality in *Gay Science* 112

A key passage concerning Nietzsche's conception of causality is *GS* 112:

Cause and Effect.—We call it “explanation,” but “description” is what distinguishes us from older stages of knowledge and science. We are better at describing—we explain just as little as our predecessors. We have uncovered a

diverse succession where the naïve man and investigator of older cultures saw only two different things, “cause” and “effect” [. . .]. The series of “causes” faces us much more completely in each case; we reason, “this and that must precede for that to follow”—but we haven’t thereby *understood* anything. The specifically qualitative aspect for every chemical process, still appears to be a “miracle,” as does every locomotion; no one has “explained” the push. And how could we explain! We are operating only with things that do not exist—with lines, surfaces, bodies, atoms, divisible times, divisible spaces. How is explanation to be at all possible when we first turn everything into a *picture*—our picture! It is enough to view science as an attempt to humanize things as faithfully as possible; we learn to describe ourselves more and more precisely as we describe things in their succession. Cause and effect: there is probably never such a duality; in truth a continuum faces us, from which we isolate a few pieces, just as we always perceive a movement only as isolated points, i.e., do not really see, but infer. The suddenness with which many effects stand out misleads us; it is a suddenness only for us. There is an infinite number of processes that elude us in this second of suddenness. An intellect that saw cause and effect as a continuum, not, as we do, as arbitrary division and dismemberment—that saw the stream of the event—would reject the concept of cause and effect and deny all determinedness.

Nietzsche associates the project of “explanation” with providing an account of the nature of cause and effect relations constitutively independent of the human interpreter. Science, he claims, cannot “explain” causality. The first reason he gives for this claim is that an adequate understanding of causality requires appeal to ideal objects that are constructed by agents interested in explaining causality. Objects such as straight lines (*GS* 121), geomantic planes (*GS* 121), or constant magnitudes (*HH* 19) do not exist in the empirical world. Ideal objects are fictions we construct. Nietzsche’s thought seems to be that because understanding causal relations requires appeal to constructed ideal objects, understanding causality itself is essentially dependent on us.

Nietzsche concludes the first major idea of *GS* 112 by claiming that it is “enough” for science to “humanize things” by engaging in “description.” The project of “description” differs from the project of “explanation” in the sense that the former embraces the interpreter’s essential role in understanding causality, while the latter denies it. Nietzsche suggests that it is “enough” for science to describe phenomena because denying our essential relation to such notions as causality would hinder successful scientific work. Viewing science as an enterprise that traffics in idealizations marks successful science.

In *GS* 112 Nietzsche then proclaims that we gain a greater understanding of *ourselves* as we understand how we as interpreting agents comprehend causal relations: “we learn to describe ourselves more and more precisely as we describe things in their succession.” The idea seems to be that comprehending causality involves separating out some event as being the cause of another event from a “continuum,” or a string of ontologically interdependent processes, and understanding this selective process requires understanding how a particular

event within a plurality is relevant to our interests within the domain of causal explanation.

Hilary Putnam gives an example that begins to explicate this selective process. According to Putnam, when I say, "failure to put out the cigarette caused the house to burn down," I do not mean that the cigarette's remaining lit was the *total* or *sufficient* cause of the house burning down.²⁰ Many other things—the cigarette's location, the flammability of the surrounding structure, etc.—are part of the sufficient cause. We regard certain parts of the sufficient cause as "background conditions," referring only to the parts of the cause that interest us as "the" cause. Suppose aliens landed on Earth and observed a house burning down. One says, "I know what caused that—the atmosphere on this planet is saturated with oxygen." The point is that in using causality in an explanatory sense one agent's "background condition" is another's "cause." What one cites as a "cause" will in part depend on the reason for asking the question.

Putnam's example aims at capturing our ordinary use of causality, but the context of *GS* 112, which is about "stages of knowledge and science," indicates that Nietzsche believes scientific work involves a similarly selective process. Nietzsche claims that "an intellect that saw cause and effect as a continuum, not, as we do, as arbitrary division and dismemberment—that saw the stream of the event—would reject the concept of cause and effect and deny all determinedness" (*GS* 112). A different kind of "intellect" could identify the sufficient cause of the house burning down because it could perceive the basic ontological interdependence of the events involved.²¹ This form of understanding would no longer individuate one event from another, and thus it could justifiably deny cause and effect relations. The implication is that grasping causality requires reference to individuated events. Because we are the kind of beings that individuate one event from another, understanding causality requires understanding us as the kind of beings who comprehend causal relations. We judge some event, with particular identity conditions, rather than some other event, with different identity conditions, to be the cause of some further event partly in relation to our explanatory interests.²² Nietzsche notes, "There is no event in itself. What happens is a group of phenomena *selected* and synthesized by an interpreting being" (*KSA* 12:1[115]). What constitutes the identity conditions of causal events is dependent on our being the judging beings we are. Understanding causal relationships therefore requires understanding our behavior as reason-giving agents. This explains why Nietzsche writes that we learn to "describe ourselves more and more precisely as we describe things in their succession" (*GS* 112).

In sum, Nietzsche argues that comprehending causality requires ideal objects and reference to our individuating activities. For Nietzsche causal sequences in scientific explanations would not be what they are in a world independent of human concern. Causality is a phenomenon that must be understood as essentially related to our interpretive actions. *GS* 112 is not the only place where

Nietzsche presents this view. Detailed notes from the later notebooks seem to support the same position.²³ Both conclusions of *GS* 112 are reiterated in *BGE* 21, where Nietzsche explains, “one should use ‘cause’ and ‘effect’ only as pure concepts, that is to say, as conventional fictions for the purpose of designation and communication,” adding that “it is we alone who have devised cause, sequence, for-each-other, relativity, constraint, number, law, freedom, motive, and purpose.”²⁴ This provides more evidence for thinking that Nietzsche endorses a constructivist conception of causality.

If the assessment of causality in *GS* 112 and similar places is taken seriously, there are strong repercussions for understanding Nietzsche’s naturalism and his positive conception of science. A proper understanding of Nietzsche’s positive conception of science that rests on his commitment to naturalism should not follow the Positive View in assuming that causal events exist as they do constitutively independent of human interpretation. It must instead be amenable to a view of naturalism consistent with Nietzsche’s constructivist conception of causality. Moreover, an adequate understanding of Nietzsche’s naturalism will not follow Clark and Dudrick in dividing the empirical domain from the normative domain. For Nietzsche a proper consideration of empirical phenomena depends on a proper understanding of the normative dimension of inquiry. Naturalistic explanations involving causality must be understood in terms of our judgments about those physical processes. Against the Negative View, this position implies that Nietzsche has a positive view of empirical explanation that does not appeal to the attainment of any nihilistic, “view from nowhere” perspective. Constructivism embraces the first-person standpoint over the nonpersonal. While Nietzsche’s position is incompatible with the Positive View, then, it is also opposed to the Negative View.

An Alternative Naturalism and Positive View

In response to these considerations one must widen what contemporary commentators typically count as a naturalistic explanation for Nietzsche. It may be best to adopt a view similar to the one presented by Schacht.²⁵ Schacht argues that on Nietzsche’s view philosophical explanations should be like scientific explanations by avoiding appeal to realms beyond the possibility of human experience, but they need not always be closely associated with the natural sciences. Nietzsche does not take any stance on whether the best naturalistic explanation will be limited to one that is scientific, and naturalistic explanations need not be causal in any traditional sense of the term.²⁶ On Schacht’s view Nietzsche’s naturalism is an attempt to provide various sorts of explanation—some more scientific, some more imaginative than others—to make sense of the world without appeal to metaphysical posits. This nicely captures the meaning of *Wissenschaft*,

which includes disciplines in the humanities and social sciences in addition to the natural sciences. Schacht's reading also has the flexibility to support my understanding of Nietzsche's constructivist conception of causality. It does not assume any explanatory divide between the natural and the normative, and the dependence relation between them is left open-ended.

In conclusion, I suggested earlier that Nietzsche's view of causality presupposes commitment to scientific constructivism. It is now easier to see why this might be the case. In *GS* 112 Nietzsche maintains that understanding causal relations requires constructed objects and events we individuate. Both processes suggest that he embraces the object constructivist thesis that the identity conditions of objects (or events) are essentially dependent on our interpretations. Nietzsche appears to support object constructivism when he explains, "it is enough to create new names and valuations [. . .] to create new 'things'" (*GS* 58), and, in the notes, "A thing = its qualities; but these equal everything which *matters* to us about that thing; a unity under which we collect the relations that *may be of some account* to us" (*KSA* 12:2[77]). It is reasonable to suppose that object constructivism entails scientific constructivism. Assuming that a fact is just an object instantiating a property, if one thinks object *o* has property *F* in virtue of our interpretive activities, then one should think that the fact that *o* has *F* is in virtue of our activities. Perhaps this explains why Nietzsche seems to connect object-hood with fact-hood: "There are no 'facts-in-themselves,' for a *sense must always be projected into them before they can be 'facts.'*" The question 'what is that?' is an *establishment of meaning* from some other viewpoint. The 'essence,' the 'essential nature,' is something perspectival" (*KSA* 12:2[149]).²⁷ The object constructivism in *GS* 112 is evidence that Nietzsche is sympathetic to a constructivist conception of science. Of course, it remains an open question whether or not Nietzsche's corpus as a whole supports scientific constructivism. My hope is that this essay provides the groundwork for such an interpretation.

Santa Clara University
jremhof@scu.edu

NOTES

1. See Jean Granier, "Perspectivism and Interpretation," in *The New Nietzsche*, ed. David B. Alison (Cambridge, MA: MIT Press, 1995), 190–200; Sarah Kofman, *Nietzsche et la métaphore* (Paris: Payot, 1972); Martin Heidegger, *Nietzsche Volume I: The Will to Power as Art*, trans. David Farrell Krell (San Francisco: Harper & Row, 1979), *Nietzsche Volume IV: Nihilism*, trans. David Farrell Krell (San Francisco: Harper & Row, 1982); Gilles Deleuze, *Nietzsche and Philosophy*, trans. Hugh Tomlinson (New York: Columbia University Press, 1983); Babette E. Babich, *Nietzsche's Philosophy of Science* (New York: State University of New York Press, 1994), "Nietzsche's 'Gay' Science," in *A Companion to Nietzsche*, ed. Keith Ansell-Pearson (Oxford: Blackwell, 2006), 97–114, "Truth, Art, and Life: Nietzsche, Epistemology, Philosophy

of Science,” in *Nietzsche, Epistemology, and Philosophy of Science*, ed. Babette E. Babich and Robert S. Cohen (Dordrecht: Kluwer, 1999), 1–13; Maurice Blanchot, “The Limits of Experience: Nihilism,” in Allison *New Nietzsche*, 121–28; Rebecca Bamford, “Nietzsche, Science, and Philosophical Nihilism,” *South African Journal of Philosophy* 24.4 (2005): 241–59.

2. See Richard Schacht, *Nietzsche* (London: Routledge, 1983), *Making Sense of Nietzsche* (Urbana: University of Illinois Press, 1995); Maudemarie Clark, *Nietzsche on Truth and Philosophy* (Cambridge: Cambridge University Press, 1990); Maudemarie Clark and David Dudrick, “The Naturalisms of *Beyond Good and Evil*,” in Ansell-Pearson, *Companion to Nietzsche*, 148–68, *The Soul of Nietzsche’s Beyond Good and Evil* (Cambridge: Cambridge University Press, 2012); Brian Leiter, *Nietzsche on Morality* (New York: Routledge, 2002), “Perspectivism in Nietzsche’s *Genealogy of Morals*,” in *Nietzsche, Genealogy, Morality: Essays on Nietzsche’s On the Genealogy of Morals*, ed. Richard Schacht (Berkeley: University of California Press, 1994), 334–58; R. Lanier Anderson, “Nietzsche’s Will to Power as a Doctrine of the Unity of Science,” *Studies in the History of Philosophy* 25.5 (1994): 729–50, “Overcoming Charity: The Case of Maudemarie Clark’s *Nietzsche on Truth and Philosophy*,” *Nietzsche-Studien* 25 (1996): 307–41, “Truth and Objectivity in Perspectivism,” *Synthese* 115 (1998): 1–32; Aaron Ridley, *Nietzsche’s Conscience* (Ithaca, NY: Cornell University Press, 1998); Michael Steven Green, *Nietzsche and the Transcendental Tradition* (Urbana: University of Illinois Press, 2002); Stephen D. Hales and Rex Welshon, *Nietzsche’s Perspectivism* (Urbana: University of Illinois Press, 2000); John Richardson, *Nietzsche’s System* (New York: Oxford University Press, 1996).

3. See, e.g., Deleuze, *Nietzsche and Philosophy*, and Babich, *Nietzsche’s Philosophy of Science*.

4. See, e.g., Leiter, *Nietzsche on Morality*; Green, *Nietzsche and the Transcendental Tradition*, and Clark and Dudrick, “Naturalisms of *Beyond Good and Evil*,” and *Soul of Nietzsche’s Beyond Good and Evil*, chap. 5.

5. Deleuze, *Nietzsche and Philosophy*, 45.

6. I use the following translations of Friedrich Nietzsche’s texts: *Antichrist* and *Thus Spoke Zarathustra* in *The Portable Nietzsche*, ed. and trans. Walter Kaufmann (New York: Penguin, 1976), 565–656, 112–439; *Beyond Good and Evil*, trans. Walter Kaufmann (New York: Vintage, 1989); *Daybreak*, ed. Maudemarie Clark and Brian Leiter, trans. R. J. Hollingdale (Cambridge: Cambridge University Press, 1997); *Human, All Too Human*, trans. R. J. Hollingdale (Cambridge: Cambridge University Press, 1996); *On the Genealogy of Morals*, trans. Walter Kaufmann (New York: Vintage, 1989); *The Gay Science*, ed. Bernard Williams, trans. Josefine Nauckoff (Cambridge: Cambridge University Press, 2001); *Twilight of the Idols*, trans. Duncan Large (Oxford: Oxford University Press, 1998); “On Truth and Lies in a Non-moral Sense,” in *Philosophy and Truth*, ed. and trans. Daniel Breazeale (Amherst: Humanity Books, 1979), 79–100; *Will to Power*, ed. Walter Kaufmann, trans. Walter Kaufmann and R. J. Hollingdale (New York: Vintage, 1968).

7. See, e.g., *GM* III:11. This refers to Bernard Reginster’s influential understanding of nihilism. See *The Affirmation of Life* (Cambridge, MA: Harvard University Press, 2006).

8. Translated as *The Will to Power* 1.

9. For a similar reading of this passage, see Lawrence Hatab, *Nietzsche’s On the Genealogy of Morality* (Cambridge: Cambridge University Press, 2008), 116.

10. For a contemporary examination of this issue, see Lynne Rudder Baker, *Naturalism and the First-Person Standpoint* (Oxford: Oxford University Press, 2013).

11. See Deleuze, *Nietzsche and Philosophy*, 75. Deleuze believes Nietzsche should have reconceived science as a discipline that also produces a “symptomatology” of forces that lead to particular views, a “typology” of the kinds of those forces (“active” or “reactive”), and a “genealogy” of the forces as having a history in particular sets of power relations.

12. Leiter, *Nietzsche on Morality*, 5.

13. Green, *Nietzsche and the Transcendental Tradition*, 4.
14. Clark and Dudrick, "Naturalisms of *Beyond Good and Evil*," 160; see also *Soul of Nietzsche's Beyond Good and Evil*, chap. 5.
15. Clark and Dudrick, "Naturalisms of *Beyond Good and Evil*," 163.
16. Clark, *Nietzsche on Truth and Philosophy*, 41.
17. Clark, *Nietzsche on Truth and Philosophy*, 40, 45, 103–5.
18. I see no difference between Clark's treatment of causality in her first book and in her later work with Dudrick.
19. The few exceptions are Anderson, "Overcoming Charity," and "Truth and Objectivity," and Schacht, *Nietzsche*, chap. 3, at the level of "man's truths."
20. Hilary Putnam, "Why There Isn't a Ready Made World," in *Realism and Reason*, ed. Hilary Putnam (Cambridge: Cambridge University Press, 1983), 205–28.
21. In Nietzsche's later work he describes the ontological interdependence of the events in terms of a fundamental network of ontologically interdependent forces described as "will to power." This is consistent with my account insofar as events within a will to power matrix require individuation in order to do useful explanatory scientific work.
22. This does not entail that the selective process is either subjective or arbitrary (recall that the "we" in the passage refers to the scientific community). Nietzsche recognizes many criteria that guide us in this process, such as the input from sensations (*BGE* 154; *TI* "Reason" 3), certain mathematical presuppositions, such as self-identity and equivalence (*HH*:11, 19; *GS* 111, 355; *BGE* 4, 21; *KSA* 12:9[97], 12:7[4], 12:2[139]), the body of accepted beliefs (*GS* 57, 335; *BGE* 12, 22; *KSA* 12:2[108]), and the epistemic values of conservatism (*GS* 110, 121), consistency (*BGE* 13; *KSA* 12:7[4]), scope (*BGE* 36), simplicity (*HH*:11; 19; *BGE* 192; *KSA* 11:26[61], 13:14[152], 12:9[97], 12:9[89], 12:9[144]), a certain kind of utility (*GS* 110; *BGE* 4, 21; *KSA* 11:34[253]), and others.
23. See, e.g., *KSA* 12:9[91], 13:14[79], 13:14[98].
24. Leiter claims that this passage represents Nietzsche's rejection of a "skeptical" view of causation because Nietzsche's remarks criticize causal relations existing only in a noumenal realm, but not phenomenal realm. See *Nietzsche on Morality*, 22–23. If by "skeptical" Leiter means "constructivist," then his reasoning is unconvincing. Nietzsche claims "it is we alone who have devised cause, sequence," and so on. True, these concepts do not hold in the noumenal realm, but their existence and applicability in the phenomenal realm are constitutively dependent on human interpretation.
25. See Schacht, *Making Sense of Nietzsche*, 187–205; Schacht, "Nietzsche's Naturalism," *Journal of Nietzsche Studies* 43.2 (2012): 185–212. See also Christa Acampora, *Contesting Nietzsche* (Chicago: University of Chicago Press, 2013), 77–80, 92–95.
26. Viewing Nietzsche's naturalism in this way raises an issue about what counts as a naturalistic explanation, and much of Nietzsche's work shows that he is sensitive to this question. Leiter's and Clark and Dudrick's views appear to be closed to the issue. However, what counts as a proper scientific explanation changes over time, and the option of questioning whether any particular scientific development is naturalistic always remains open. In fact, some have argued that Nietzsche's will to power hypothesis is a novel attempt to provide a fundamentally naturalistic explanation of worldly phenomena in order to replace non-naturalistic explanations. See, e.g., Cristoph Cox, *Nietzsche: Naturalism and Interpretation* (Berkeley: University of California Press, 1999), chap. 5.
27. Translated as *The Will to Power* 556.